

## CLAIMS

1. A radio communications system comprising:

a first antenna (20) having a directivity electrically switchable;

5 a second antenna (11); and

first and second radio devices (30, 10) mutually transmitting and receiving a radio wave through a radio transmission path via said first and second antennas (20, 11), wherein:

10 said first radio device (30) receives a radio wave or waves from said second radio device (10) while changing a directivity of said first antenna (20) with prescribed patterns to form a plurality of directivities, generates a first receive signal profile indicative of a strength profile of a plurality of radio waves received with the respective ones of the directivities, and generates a first private key (Ks2) based on the generated first receive signal profile; and

15 said second radio device (10) receives a radio wave or waves from said first radio device (30) while changing a directivity of said first antenna (20) with prescribed patterns to form a plurality of directivities, generates a second receive signal profile indicative of a strength profile of a plurality of radio waves received with the respective ones of the directivities, and generates a second private key (Ks1) identical to said first  
20 private key (Ks2) based on the generated second receive signal profile.

2. The radio communications system of claim 1, wherein:

said first and second receive signal profiles are each formed of a plurality of strength corresponding to said plurality of directivities; and

25 said first and second radio devices (30, 10) multivalue said plurality of strength to generate said first and second private keys (Ks2, Ks1), respectively.

3. The radio communications system of claim 1, wherein said first and second

radio devices (30, 10) transmit and receive said plurality of radio waves in a time division duplex system.

4. The radio communications system of claim 1, wherein said first radio device  
5 (30) verifies that said first private key (Ks2) generated matches said second private key (Ks1).

5. A radio communications system comprising:  
a first antenna (20) having a directivity electrically switchable;  
10 a second antenna (11); and  
first and second radio devices (30A, 10A) mutually transmitting and receiving a radio wave through a radio transmission path via said first and second antennas (20, 11), wherein:

said first radio device (30A) receives a radio wave or waves corresponding to a  
15 plurality of data transmitted by said second radio device (10A) in accordance with a prescribed communications protocol while changing a directivity of said first antenna (20) with prescribed patterns to form a plurality of directivities, generates a first receive signal profile indicative of a strength profile of a plurality of radio waves received with the respective ones of the directivities, and generates a first private key (Ks2) based on  
20 the generated first receive signal profile; and

said second radio device (10A) receives a radio wave or waves corresponding to a plurality of data transmitted by said first radio device (30A) in accordance with a prescribed communications protocol while changing a directivity of said first antenna (20) with prescribed patterns to form a plurality of directivities, generates a second  
25 receive signal profile indicative of a strength profile of a plurality of radio waves received with the respective ones of the directivities, and generates a second private key (Ks1) identical to said first private key (Ks2) based on the generated second receive signal profile.

6. The radio communications system of claim 5, wherein when said first radio device (30A) has said first antenna (20) controlled to be omnidirectional said first radio device (30A) establishes said radio transmission path between said first radio device (30A) and said second radio device (10A) and thereafter said first radio device (30A) has said first antenna (20) changing the directivity to form said plurality of directivities, while said first radio device (30A) communicates said plurality of data with said second radio device (10A).

7. The radio communications system of claim 6, wherein when said first radio device (30A) communicates each of said data with said second radio device (10A), said first radio device (30A) updates a directivity of said first antenna (20) to receive said data from said second radio device (10A) and maintains said updated directivity of said first antenna (20) to transmit said received data to said second radio device (10A).

8. The radio communications system of claim 6, wherein:  
said prescribed communications protocol is formed of a plurality of hierarchical layers;

said plurality of data are included in a data format in a hierarchical layer of said plurality of hierarchical layers converting said data to said electrical signal; and

said hierarchical layer converting said data to said electrical signal is common to a plurality of communications protocols.

9. The radio communications system of claim 5, wherein said plurality of data are each formed of a section detecting a strength of a radio wave received from said first and second radio devices (30A, 10A) and a section changing the directivity of said first antenna (20).

10. The radio communications system of any of claims 1-9, wherein when said

first private key (Ks2) generated does not match said second private key (Ks1), said first radio device (30, 30A) matches said first private key (Ks2) to said second private key (Ks1).

5            11. The radio communications system of any of claims 1-9, wherein said first antenna (20) is provided for said first radio device (30, 30A) arranged adjacent to a terminal (50) of an eavesdropper.

10           12. The radio communications system of any of claims 1-9, wherein said first and second radio devices (30, 30A, 10, 10A) employ said first and second private keys (Ks2, Ks1) to encrypt and decrypt data, and communicate said data.